	Centre Number	Candidate Number
Candidate Name ______________________		

International General Certificate of Secondary Education

UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

PHYSICS 0625/6

PAPER 6 Alternative to Practical

Monday 22 NOVEMBER 1999 Morning 1 hour

Candidates answer on the question paper.
Additional materials:
Electronic calculator and/or Mathematical tables
Ruler (30 cm)

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

You may use a calculator.

FOR EXAMINER'S USE	
1	
2	
3	
4	
5	
TOTAL	

This question paper consists of 11 printed pages and 1 blank page.

SB (SLC/DJ) QK93709/2

For Examiner's Use

1 A transparent U-tube is held vertically in a clamp. Some water and kerosene are poured into the tube and the final levels of the liquids are as shown in Fig. 1.1. This diagram is drawn full size.

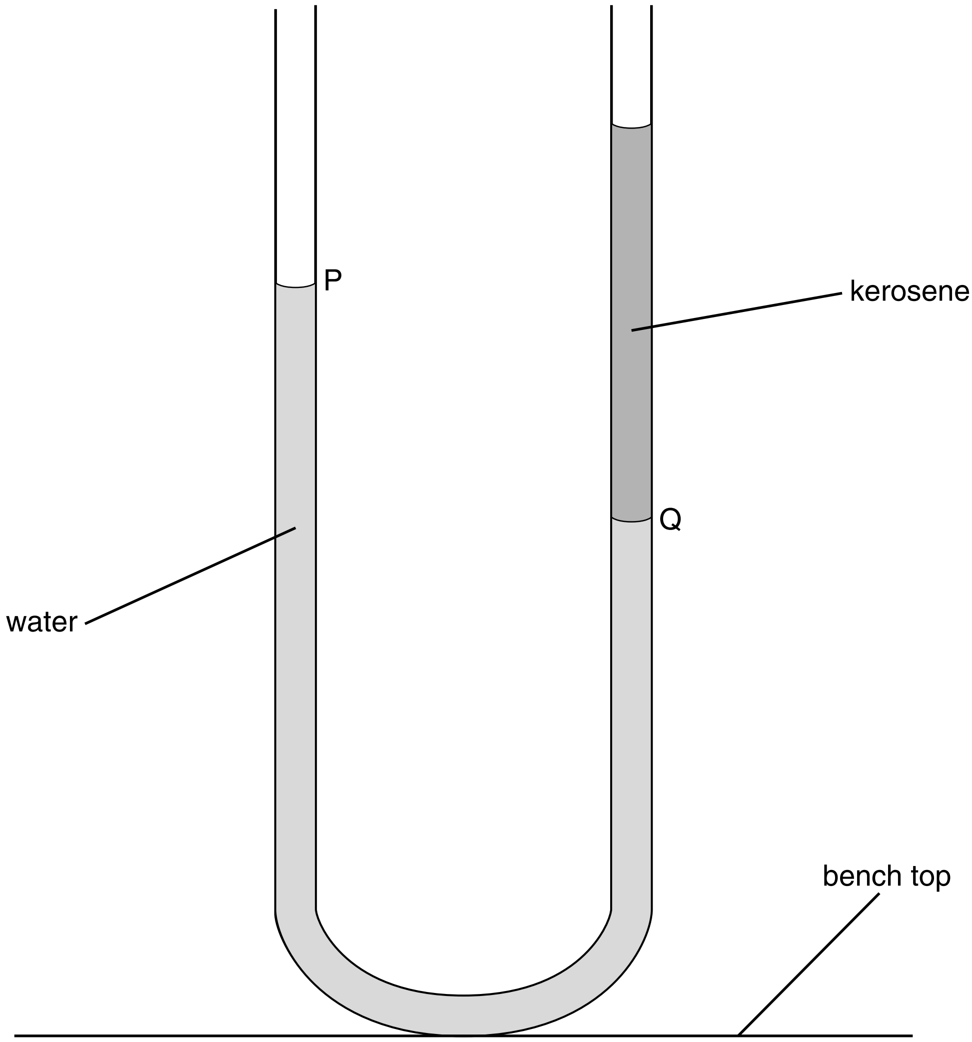

Fig. 1.1

(a) Using your own ruler, make measurements which will enable you to determine *h*, the difference between the vertical heights of the water levels above the bench top at P and at Q. Show all of your measurements and your calculation of *h* in the space below.

[4]

(b) When the experiment is carried out in a laboratory, the vertical height of the water level at **P** is measured using a half-metre rule.

Explain how you would use the rule when the apparatus is on a bench in the laboratory. Your answer should include how you would position the rule and what you would do to obtain an accurate value for the height of the water level. You may draw a diagram or draw on Fig. 1.1 if you wish.

....

....

....

....[4]

2 **(a)** The circuit symbol for a diode is shown in Fig. 2.1. The diode conducts when the polarity is as shown.

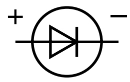

Fig. 2.1

Draw a circuit diagram showing the following components, all connected in series:
a d.c. power supply, labelled to show its polarity,
a fixed resistor,
a diode,
a switch.

On your circuit diagram, the switch should be shown open and the diode should be able to conduct when the switch is closed.

[3]

(b) **(i)** Redraw your circuit diagram, adding an ammeter to measure the current in the diode. Label the polarity of the ammeter terminals.

(ii) Is there any other position in the circuit where you could put the ammeter to measure the current through the diode? Tick one box.

yes	
no	

Give one reason to support your answer.

....

....

....
[3]

For Examiner's Use

(c) (i) Assuming that the fixed resistor has a resistance of 100 Ω and that the potential difference of the power supply is 3.0 V, calculate the maximum current I_{max} in the circuit.

I_{max} = ...

(ii) In order to calculate the value for I_{max} in **(i)** above, what assumption did you make about the resistance of the circuit?

....

....

[2]

For Examiner's Use

3 A small steel ball is dropped through a hole in a card and falls through a clear plastic tube before it hits a glass surface as shown in Fig. 3.1. There is a rubber band on the outside of the tube. This band can be moved along the tube.

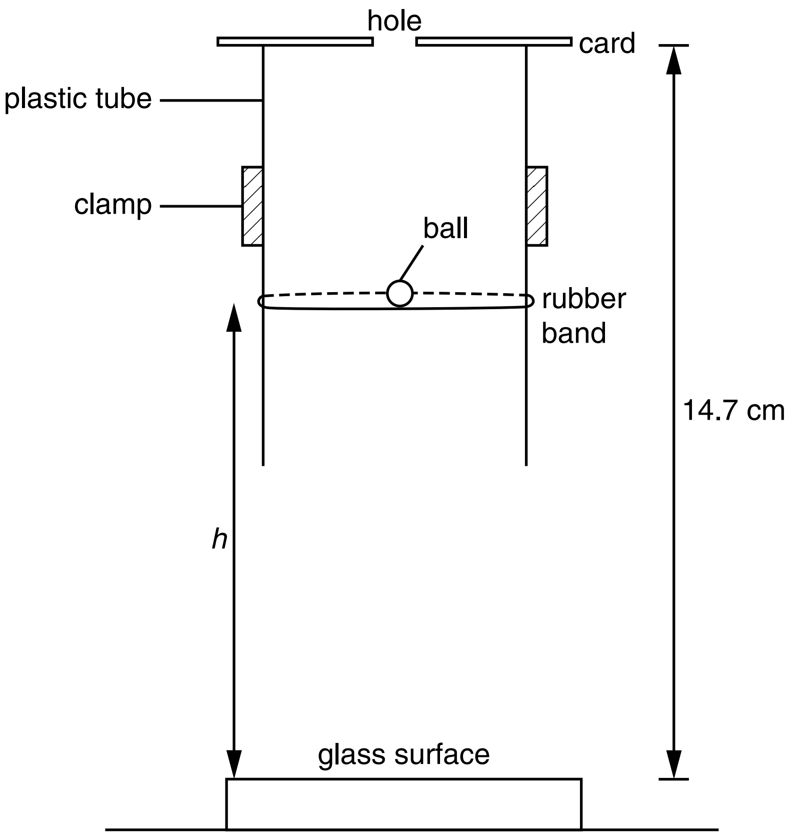

Fig. 3.1

When the ball bounces, it rises up inside the tube to a height shown as *h* in Fig. 3.1. The top of the bounce is marked by the position of the rubber band.

(a) Four different balls are used. These are dropped from the same height onto four pieces of glass, which are 2 mm thick. The areas of the top surface of the glass are 56 cm^2, 112 cm^2, 224 cm^2 and 450 cm^2. The results of this experiment are shown in Fig. 3.2.

mass of ball / g	values of *h* / cm for each of the four pieces of glass			
	56 cm^2	112 cm^2	224 cm^2	450 cm^2
1.08	0	0	0	0
0.40	1.8	1.8	1.8	1.8
0.24	3.5	3.5	3.5	3.5
0.12	5.4	5.4	5.4	5.4

Fig. 3.2

(i) 1. Calculate the ratio $\frac{\text{maximum mass}}{\text{minimum mass}}$ for the balls.

ratio of masses = ...

2. Calculate the ratio $\frac{\text{maximum area}}{\text{minimum area}}$ for the glass surfaces.

ratio of areas = ...

(ii) Use the table to justify the assertion that the value for *h* does **not** depend upon the value for the surface area of the glass.

....

....

....

....

(iii) Describe how the height *h* depends upon the mass of the ball for this experiment.

....

....

[6]

(b) The height of the hole above the surface of the glass block is 14.7 cm. Each ball is released from this height. The following relation gives the change in potential energy of each ball when it falls.

energy = mass x *g* x height

All of this energy becomes kinetic energy just before the moment of impact with the glass.

Suggest what happens to this kinetic energy after the impact for the heaviest and for the lightest balls. Your answer should include information from the table.

heaviest ball ....

....

lightest ball ....

....[2]

4 A small mass of ammonium chloride is dissolved in some water, causing the temperature of the water to fall. The apparatus, which is used to determine the fall in temperature, is shown in Fig. 4.1.

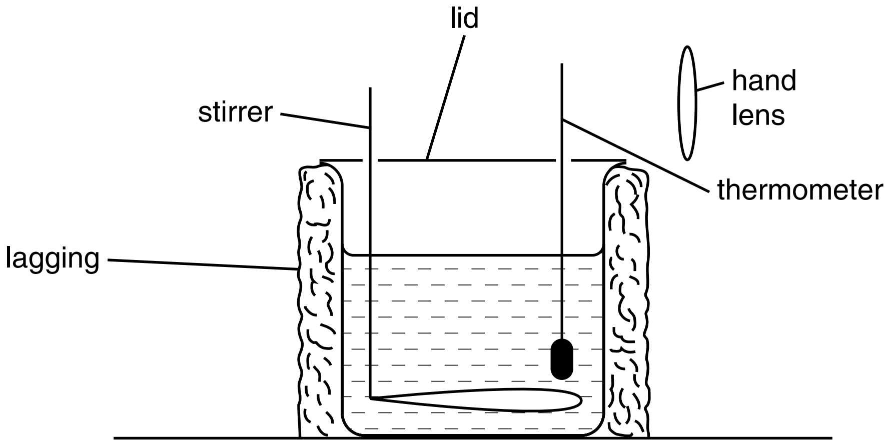

Fig. 4.1

(a) Give a reason for using each of the following items of apparatus.

(i) the lagging

....

....

(ii) the stirrer

....

....

(iii) the hand lens

....

....
[3]

(b) Part of the thermometer that is used to determine the fall in temperature is shown in Fig. 4.2. The diagram shows the thermometer before and after adding the ammonium chloride.

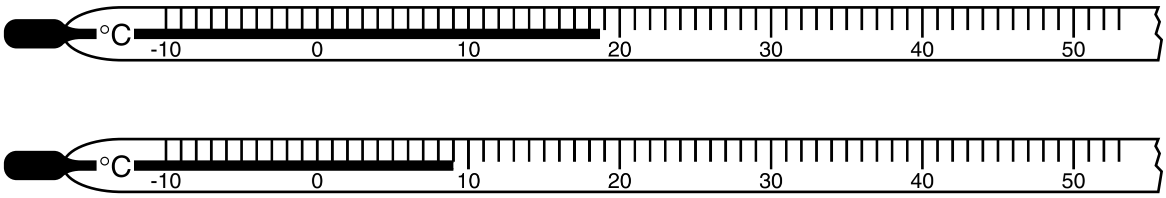

Fig. 4.2

(i) Record each of the temperatures and determine the fall in temperature.

temperature before adding the ammonium chloride = ...

temperature after adding the ammonium chloride = ...

fall in temperature = ...

(ii) In Fig. 4.2 the liquid thread is shown along the edge of the scale marks. This is the recommended way to position the liquid thread before reading a temperature. In Fig. 4.3 the thread is positioned away from the edge of the scale.

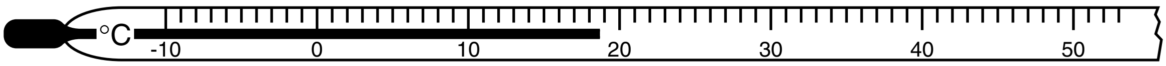

Fig. 4.3

Suggest a reason for the recommended way to use a thermometer.

....

....
[4]

(c) How would you avoid making a parallax error when reading the thermometer shown in Fig. 4.2? You may draw a labelled diagram if you wish.

....[1]

5 An image of the filament of a lamp is produced on a screen using the apparatus shown in Fig. 5.1. The image distance, shown as *x*, is measured and recorded.

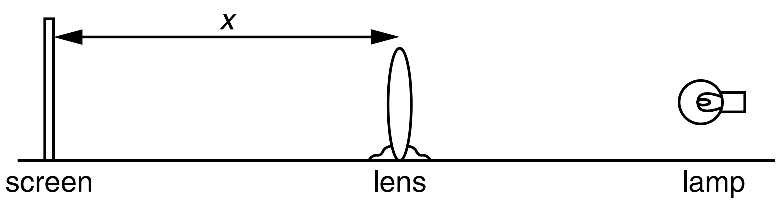

Fig. 5.1

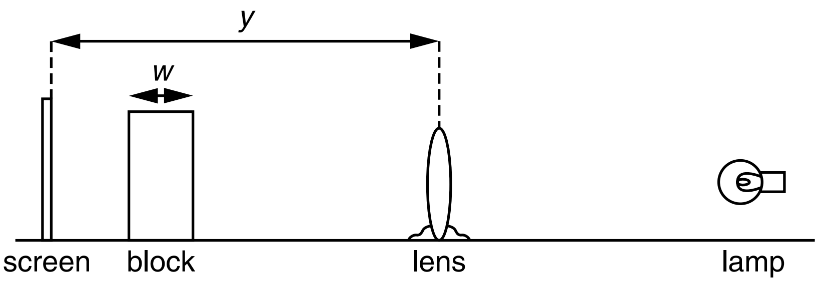

Fig. 5.2

A glass block is now placed between the lens and the screen as shown in Fig. 5.2. The block has width *w*. The image is out of focus. The screen is moved until the image is once again sharp. The lens to screen distance, shown as *y* in Fig. 5.2, is now greater than *x*. The new value for *y* is measured and recorded.

The experiment is repeated for different values of the lamp to lens distance. The values obtained for *x* and *y* are given in Fig. 5.3.

y/mm	175	184	212	250	290
x/mm	152	163	189	229	269
$(y - x)$/mm					

Fig. 5.3

For Examiner's Use

(a) Plot the graph of y/mm (y-axis) against x/mm (x-axis). Start your x-axis at x/mm = 140 and your y-axis at y/mm = 170. Draw the best straight line to fit the plotted points.

[5]

(b) (i) Determine the values of $(y - x)$ and enter them in the table of Fig. 5.3, shown on page 10. On Fig. 5.2, show what is meant by the distance $(y - x)$.

(ii) State what happens to the value for $(y - x)$ as the value for x increases.

....

(iii) A second glass block of width greater than w is used in a repeat experiment. Suggest how this might affect the values of $(y - x)$.

....

....

....

[3]

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